# CHARACTERISTIC SEISMIC SIGNAL BEFORE THE 2014 FLANK ERUPTION AT STROMBOLI VOLCANO, ITALY

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Stromboli volcano in southern Italy is famous for continuous Strombolian activities at the summit craters. Prior to the flank effusive eruption on August 7, 2014, characteristic pattern in seismic signal amplitude was observed from July 27 to August 6. The data show the repeating cycle (Fig. 1): (1) quiet period (QP), (2) high-frequency pulse period (PP), and (3) explosion period (EP). This kind of repeating pattern in seismic signal had never been reported at Stromboli volcano.

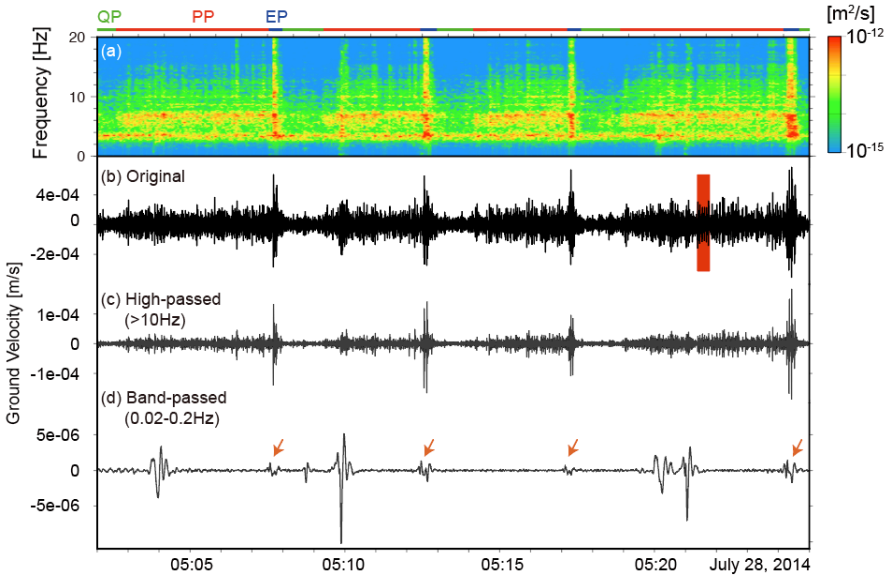


*Fig. 1. Characteristic cyclic pattern in seismic signal. Top: spectrogram of seismic data, Bottom: seismic waveforms.*

The signal during PP looks like a continuous vibration at a glance (Fig. 1(b)). However, after the high-pass filtering, we can clearly identify repeating high-frequency pulses (Fig. 1(c)). Waveforms of the pulses are quite similar each other. Therefore, we chose several pulses as template events and detected hidden pulses in continuous seismic data based on waveform cross-correlation. Although the characteristic cycle in seismic signal was observed during about 10 days before the flank eruption, isolated pulse arose sporadically from early June. After the beginning of collapse of summit craters on August 6, on the other hand, high-frequency pulse in seismogram completely disappeared.

Comparing the seismic signal with infrasound data, we found that the infrasound signal shows similar cyclic pattern in signal amplitude coincident with the seismic signal. Back azimuth of infrasound signal indicates the sound excitation at the central (C) crater. We can also confirm that Strombolian explosion occurred at the C crater coincident with EP from thermal video images. Therefore, we conclude that the pulses in seismic and infrasound signal during this period are excited by the C crater activities, and pulses in PP and EP correspond to puffing and Strombolian explosion, respectively.

Infrasound record shown in Fig. 3 of Ripepe et al. (2002) is quite resemble to our record and they visually confirmed puffing and explosion during the temporary observation in 1999. However, cyclic pattern in puffing and explosion did not occur at that time. The physical mechanisms of repeatability in puffing and explosion is a future consideration.

Reference

Ripepe, M., Harris, A. J. L., Carniel, R. Thermal, seismic and infrasonic evidences of variable degassing rates at Stromboli Volcano. *J. Volcanol. Geotherm. Res.*, 118, 285–297, 2002.